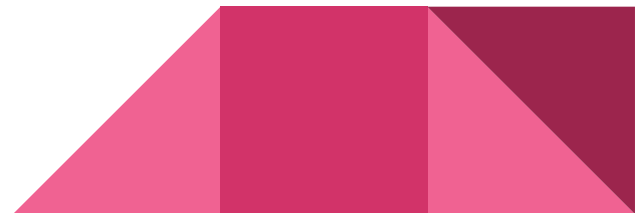# The European Stave

A Statistical Study of the Relationship between Nationalism and Music

Data collection

We have collected more than 3000 classical pieces of music

Those pieces came from 10 countries.

- 9 relevant in classic music:

    - Austria, Germany, Italy, France, Russia, Poland, Czech Republic, Hungary, Spain.

- One for control:

    - United Kingdom.

Data table

We summerized all data in this table. Blue: nationality most represented in that cuntry. Yellow: Country where the nationality is most reresented. Green: both blue and yellow.

From \ To	Germany	Austria	Spain	France	Hungary	Italy	Poland	United Kingdom	Czechia	Russia
Germany	47%	17%	0%	7%	1%	13%	1%	0%	6%	8%
Austria	27%	25%	1%	8%	3%	10%	0%	3%	7%	16%
Spain	23%	17%	15%	14%	3%	7%	2%	3%	2%	13%
France	20%	15%	1%	31%	2%	18%	1%	3%	4%	7%
Hungary	24%	9%	2%	9%	31%	21%	1%	1%	1%	2%
Italy	17%	6%	1%	7%	2%	59%	1%	1%	2%	4%
Poland	23%	18%	1%	11%	1%	10%	23%	2%	3%	9%
United Kingdom	39%	11%	0%	9%	3%	5%	4%	11%	2%	17%
Czechia	29%	17%	1%	11%	0%	19%	3%	1%	17%	3%
Russia	28%	6%	0%	7%	1%	5%	6%	1%	4%	40%

Comparison between countries

We compared countries between them. This is a very good example. Italy is the country that hears the most its own composers and Austria shows a great diversity.
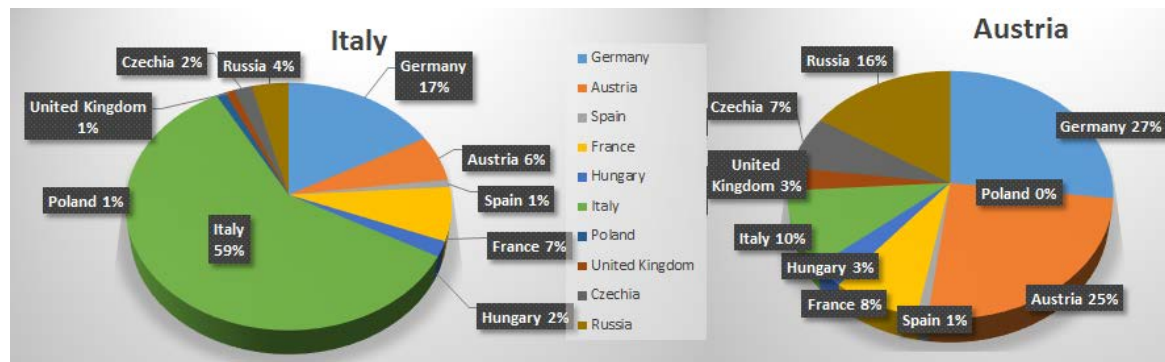
Percentages

Country	Percentage
United Kingdom	11%
Spain	15%
Czech Republic	17%
Poland	23%
Austria	25%
France	31%
Hungary	31%
Russia	40%
Germany	47%
Italy	59%

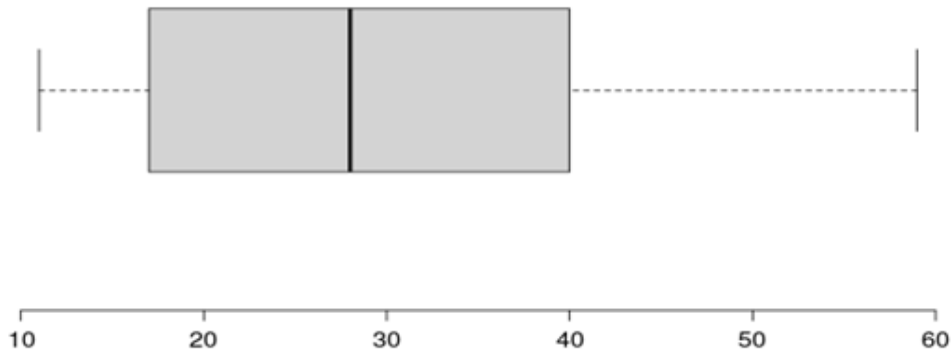$$Q1 = \frac{n+1}{4} \, th \; element = \; 2.75th \; element = \; \frac{15}{4} + 3\frac{17}{4} = 16.5\%$$

$$Median = \frac{n}{2} \, th \; element = \; 5.5th \; element = \; \frac{25}{2} + \frac{31}{2} = 28\%$$

$$Q3 = \frac{3(n+1)}{4} \, th \; element = \; 8.25th \; element = \; 3\frac{40}{4} + \frac{47}{4} = 41.75\%$$

Five-number summary
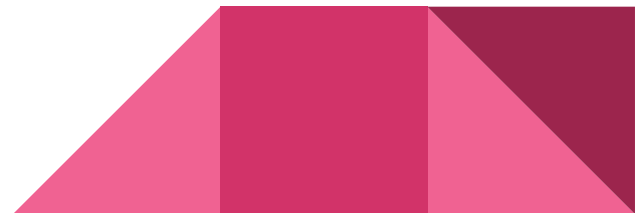
Used to obtain an abstract of the distribution of the data

Minimum	Q1	Median	Q3	Maximum
11%	16,50%	28%	41,75%	59%

Average nationalism

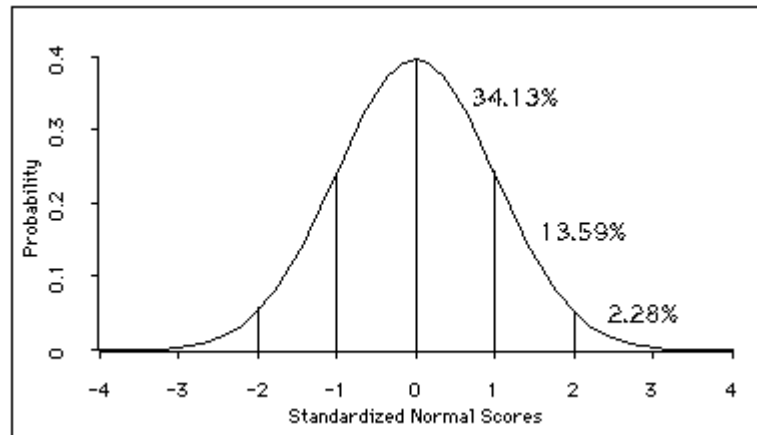The average nationalism in the 10 countries is a 30%

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = \frac{47 + 25 + 15 + 31 + 31 + 59 + 23 + 11 + 17 + 40}{10} = 30\%$$

Z-test

Used to compare proportions

Two independent variables

Curve of the normal distribution

	German composers	Composers from other countries	Total
Germany	141	159	300
Other countries	653	2055	2708
Total	794	2214	3008

Table used for the Z-test

Variables

p1 = percentage of composers of the host country performed in the host country in comparison with the total number of composers performed in the host country

p2 = percentage of composers of the host country performed in the other countries in comparison with the total number of composers performed in those other countries

n1 = total number of composers performed in the host country

n2 = total composers performed in other countries

Value

$$p = \frac{n_1 \cdot p_1 + n_2 \cdot p_2}{n_1 + n_2}$$

Country	Z
Germany	8,53
United Kingdom	8,98
Russia	15,81
France	10,82
Austria	4,85
Hungary	21,79
Italy	20,16
Poland	16,58
Czech Republic	10,51
Spain	15,58

$$Z = \frac{p_1 - p_2}{\sqrt{p \cdot (1 - p) \cdot (\frac{1}{n_1} + \frac{1}{n_2})}}$$

$Z > 4$ ➤ $p < 0.001$

Obtained values of the European countries for the Z-test
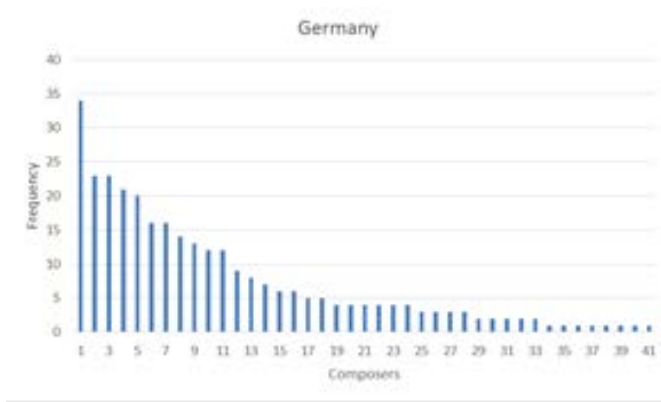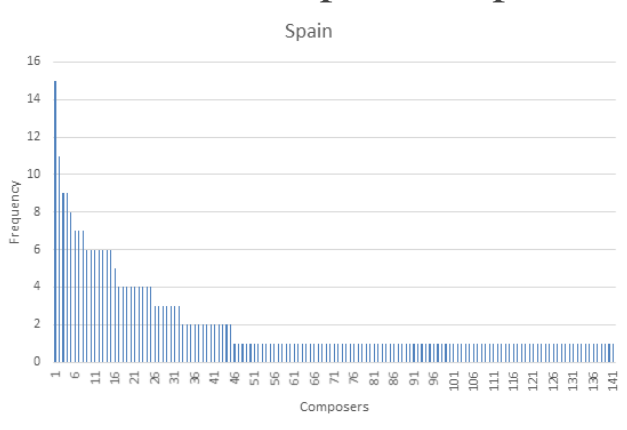
Most Frequent Composers

- We studied which were the most listened composers in each of the countries of the sample.

- We found significant differences between two subgroups of the sample, which we called the Nationalist and the Non-nationalist groups.

- The groups are the following:

  - Nationalists: Germany, Austria, Russia, Italy, France

  - Non-nationalists: Poland, Hungary, Czech Republic, Spain, England

Most Frequent Composers

- We found a significant difference between the countries classified as nationalists and the rest.

- Different fitting functions

- Different top 5 composers

Spain		Germany	
#	Composer	#	Composer
1	Wolfgang Amadeus Mozart	1	Wolfgang Amadeus Mozart
2	Ludwig Van Beethoven	2	Ludwig Van Beethoven
3	Richard Wagner	3	Johan Sebastian Bach
4	Maurice Ravel	4	Johannes Brahms
5	Johannes Brahms	5	Robert Schumann

Most Frequent Composers

- Lastly, we found the top composers of the whole sample.

Overall Sample	
F	**Composer**
156	Wolfgang Amadeus Mozart
148	Ludwig van Beethoven
114	Johannes Brahms
77	Pyotr Ilyich Tchaikovsky
75	Johann Sebastian Bach

European Concert Hall: Nationalities

We wanted to see how would be a Concert Hall that had no national influences. Doing the weightened average with the population we obtained these results:

Country	Population (in millions)	Percentage	Concerts
Germany	81	29%	88
Austria	9	12%	36
Spain	46	2%	5
France	65	11%	34
Hungary	10	2%	7
Italy	60	15%	44
Poland	39	4%	13
United Kingdom	66	3%	8
Czechia	11	4%	12
Russia	143	18%	53

European Concert Hall: Nationalities

Country	Degree of deviation	Country	Degree of deviation
Germany	50	Italy	88
Austria	35	Poland	48
Spain	46	United Kingdom	37
France	50	Czechia	43
Hungary	69	Russia	50

We used our average ditribution to evaluate the "deviation" of all countries. We created a value (the sum of the diference with respect to the average) for each country called the degree of deviation.

European concert hall: Composers
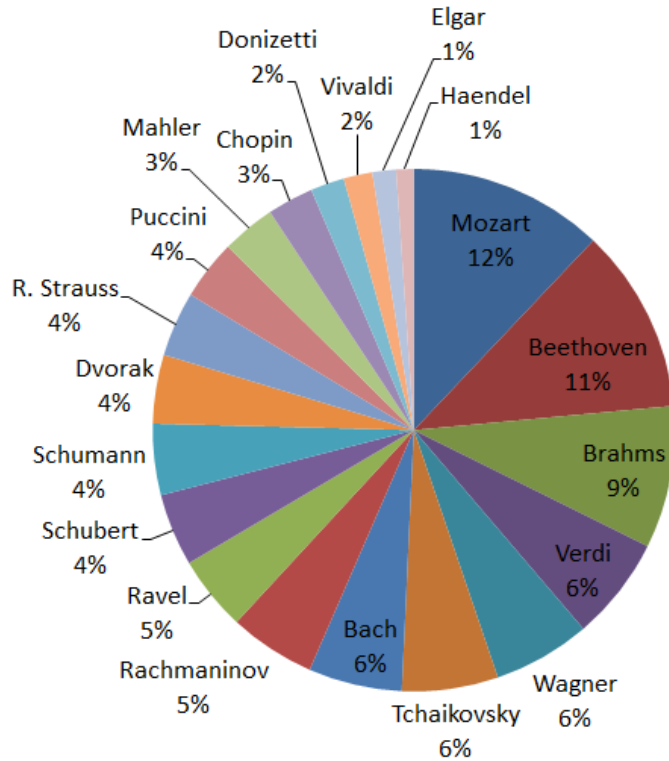
We also wanted to see which composers would play in our Concert Hall. We took the most frequent composers and diveded them into 300 concerts.

Thank you for your attention!